LAWRENCE LIVERMORE
REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory, Aug. 23-27, 2010

Americans used less energy in 2009

Wind power is on the increase across the nation.

The most recent energy flow charts, released by the Laboratory this week, show that Americans are using less energy overall and making more use of renewable energy resources due in part to the current economic downturn and advances in technology.

The United States used significantly less coal and petroleum in 2009 than in 2008, and significantly more wind power. There also was a decline in natural gas use and increases in solar, hydro and geothermal power.

"Energy use tends to follow the level of economic activity, and that level declined last year. At the same time, higher-efficiency appliances and vehicles reduced energy use even further," said A.J. Simon, an LLNL energy systems analyst who develops the energy flow charts using data provided by the Department of Energy's Energy Information Administration. "As a result, people and businesses are using less energy in general."

Energy use declined 4.9 percent from 2008 to 2009. The nation has never seen a year-over-year drop this large in the records that go back to 1949. The last time the United States got close was from 1981 to 1982, when energy use declined 4 percent.

To read more, go to http://www.csmonitor.com/Science/2010/0825/Americans-using-less-energy-thanks-to-recession-technology

The great fizz

Foraminifera from the core samples, examined while at sea.

Loosen the screw-top of a soda bottle, and you soon hear the carbon dioxide begin to escape. Then take the cap off quickly, and see the beverage foam and fizz out of the bottle. Once the pressure equalizes, the beverage is ready to drink.

Livermore scientist Tom Guilderson and his Rutgers colleagues say that something very similar happened on a huge scale over more than a 1,000-year period after the end of the last ice age -- or glaciation, as scientists call it.

According to a paper published recently in the journal Nature, the last ice age featured a decrease in the amount of atmospheric carbon dioxide and an increase in the atmospheric carbon 14, the isotope that guides scientists in evaluating the rate of decay of everything from shells to trees.

In recent years, other researchers have suggested that some of that carbon dioxide flowed back into the Northern Hemisphere rather than being entirely released into the atmosphere in the Southern Hemisphere.

But Guilderson and his colleagues disagree, based on sediment cores they gathered off the coasts of Antarctica and New Zealand.

For more, go to http://www.sciencedaily.com/releases/2010/08/100825131443.htm

Death of star brings life

A Hubble Space Telescope image of a nearby supernova remnant. Photo courtesy of NASA, ESA, HEIC, and the Hubble Heritage Team STScI/AURA).

Life on Earth may have come from a different place in the cosmos.

New Lab research shows that a bias in the way the building blocks (amino acids) of proteins twist could be due to supernovae.

Organic molecules often come in two versions that are mirror images of each other, much as right and left hands appear identical but possess reversed features.

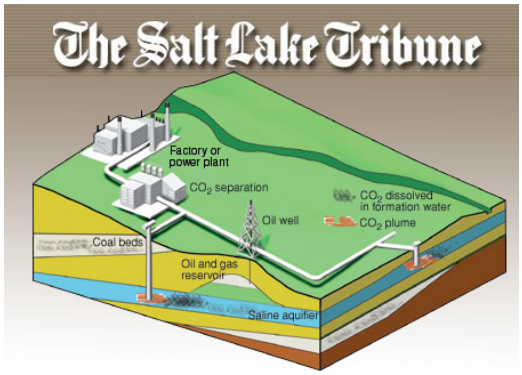
On Earth, amino acids that form the proteins for life are virtually all "left-handed." Samples of certain amino acids obtained from the Murchison meteorite were mostly left-handed as well as suggesting there could be a bias for left-handed amino acids throughout the rest of the cosmos.

Now Lab researchers suggest that supernovaes might be the culprits behind this mysterious effect. The key lies in the nitrogen atoms common to all amino acids, according to LLNL nuclear astrophysicist Richard Boyd and his colleagues.

To read more, go to

http://www.space.com/scienceastronomy/supernova-life-origins-spin-chirality-100816.html

Can carbon capture slow down climate change?



One approach to help stem the increase of carbon dioxide in Earth's atmosphere is to capture it at the source and inject it into an underground formation.

Approximately $100 million has been pledged by the U.S. Energy Department and others to test a Utah research team's idea that carbon dioxide can be stored underground to help address global climate disruption.

But can it stop climate change? No, according to the Lab's Julio Friedmann, who says it can help a little, but it isn't necessarily the solution.

Friedmann, director the Laboratory's carbon management program, said that areas with successful carbon-capture programs will be "industrial magnets." It makes good sense for projects to look for ways to maximize the economic opportunities in a "carbon-constrained world."

Friedmann disputed the notion that scientists disagree about the existence of climate disruption.

"There is no serious scientific question whether climate change is real, whether climate change is man-made or that the impacts of climate change will be damaging," he said, stating the view expressed by the National Academies of Science and echoed unanimously by scientific societies worldwide.

To read more, go to http://www.sltrib.com/sltrib/home/50133693-76/carbon-ustar-utah-climate.html.csp

What's ahead for astronomy

A 2010 rendering of the LSST, a proposed 8.4-meter ground-based telescope that will be built on a mountaintop in Chile. Photo courtesy of LSST Corp./NOAO.

How do astronomers manage to study the vast universe at once? They get together every 10 years to assess the field as a whole and recommend what projects should be funded for the next decade. This "decadal review" includes what the next 10 years of U.S. astronomy will look like.

Hundreds of scientific proposals, "state of the profession," and technology development papers were submitted by the community to a committee of distinguished astronomers from various parts of the field. The long-awaited findings were introduced via a webcast to 80 different institutions recently.

The committee highlighted three main areas of science: Cosmic Dawn, New Worlds and the Physics of the Universe.

On the ground, the Large Synoptic Survey Telescope got a lot of attention. This 8-meter survey telescope, in which the Laboratory has played a large role in development, will contribute to a host of science objectives with its deep surveys, making the data available to anyone.

To read more, go to http://news.discovery.com/space/whats-ahead-for-astronomy-in-the-next-decade.html

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https://publicaffairs.llnl.gov/news/lab_report/2010index.html